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ABSTRACT

Several epistemic formulations have been advanced to explain cognitive development. Many writers have divided the field of psychology into three basic underlying models: the mechanistic, organismic, and dialectic models. An examination of epistemic positions reveals five broadly defined positions on how behavior develops within a given organism. In position I, one can adhere to the notion that behavior and/or knowledge is innately inset. Within this position are the organismic viewpoints of Leibnitz, Gesell, and Descartes. In position II, the organizational elements necessary to a particular behavioral development are seen as either innately inset or as developing along epigenetic guidelines, while particular content displayed is seen as resulting from interaction with the external environment. Within position II are the organismic views of Kant and Piaget. Position III arises within the dialectical paradigm of Hegel and holds that factors intrinsic and extrinsic to the organism are necessary both to the organization and content of knowledge. Position IV, in the dialectical paradigm of Marx, holds that an active organism both generates changes in the structure and organization of the external environment and derives organization and content of its intellect from external sources. In position V, both form and content of behavior are derived passively from external sources, with some account being taken of the material realities as causal in the organism. This mechanistic view is found in more radical forms of behaviorism. (NB)

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A Delineation of Epistemic Possibilities In Explanations of Cognitive Development

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Many have sought to define cognition, and determine how an organism comes to acquire knowledge. Indeed, since psychology came into being, as a science emerging from the realm of philosophical speculation, this question has been one of its primary concerns, and several epistemic formulations, which this paper will seek to examine, have been advanced in order to explain cognitive development.

Cognition can be defined as the process of knowing, whereby we come to a recognition of the object of thought. It is the complex of operations we employ in thinking, and the resultant process that leads to our consciousness of the particular content of which our thoughts are currently constituted.

Within cognition itself there are several sub-areas that require our examination. "Sensation," which is the direct result of the present stimulation of the sense organs, provides us with the neurological datum that engenders our awareness of objects and an environment external to ourselves. "Perception," based on sensory input, becomes the awareness of the object by referring the sensation to an external object. It involves the recognition of the impinging stimuli in terms of its external causal correlate, whether it be an external object that is currently impinging on the sensory modalities, or a memory that has been retrieved from storage. Finally, within the cognitive process

proper, there is "apperception," which allows the perception of a given object or fact "X" to be related to what is already known about "X." This is the process that allows the current content of thought, which is perceived, to be related to previously acquired knowledge.

The relationship of cognition and its various facets to intelligence should become clear when we define intelligence as the capacity for acquiring knowledge and understanding. We can expand this definition and conceptualize intelligence as the ability to develop and employ suitable cognitive strategies in order to adapt to available environmental information in a maximally efficient manner (Note: by "adapt" we mean interrelate and draw appropriate conclusions from incoming information, resulting in an efficient action plan). Thus, we see that cognition, as previously defined, is the mental operation we employ in the process of thought, and intelligence is the efficiency with which we develop and employ these operations, as measured by the end result displayed in the behaviors observed by those about us.

Now that we have briefly examined cognition, let us now move on to examine how an object of thought comes about. How do we acquire knowledge via the process of learning? As we shall see, there are several epistemologies attempting to answer the basic question of the origin of the knowledge and/or the behaviors the human organism displays.

In a recent series of articles, by Reese and Overton (1970, 1973), the authors have examined and delineated two operative paradigms that they hold underlie all theories about the nature of man and his

behavioral development in present-day psychology. These two models have been labeled the organismic and mechanistic viewpoints of human functioning.

Reese and Overton maintain that all theories presuppose one of these general models according to which concepts and constructs are formulated. Further, these basic metaphysical models are incompatible, resulting in families of theories that are irreducible to theories formulated within other paradigms. Such models should be viewed as metaphorical, "as if" thinking, that represent reality, but are not mirrors of reality. They show how a theory is to be applied, what are and are not meaningful problems for investigation, and what types of methods are to be accepted.

In their articles, these models are held to be neither true nor false, but are rather more or less useful, whereas theories appearing within differing models are held to be true or false as determined by the empirical investigations dictated by the model within which they appear. Like Kuhn (1970), these authors see differences between world views as being irreconcilable since within models there are different meanings of words due to underlying assumptions, different truth criteria, and different perceptual worlds, as adherents to opposing models will see things in different relationships to each other.

Langer (1969) advances a similar viewpoint on the conceptual underpinnings of the science. He sets forth three models as primary: the "mechanical mirror model," which holds that the human organism develops into whatever it is made to be by its environment; the "organic lamp" model, which holds that the human organism develops to be what it makes

of itself by its own actions; and the psychoanalytic model, which is held to be separable from the organic model due to its emphasis on the irrational nature of man in opposition to the stress on the intellectual and rational aspects of human development found in such theorists as Jean Piaget in the organismic camp. This difference would appear to be more a matter of emphasis, however, as the psychoanalytic model is not held to be separable from the organismic paradigm in other than its emphasis on the irrational in man's nature.

Finally, in a restatement of Reese and Overton's original position, Baltes, Reese and Nesselroade recognized the existance of a third basic paradigm, i.e., Dialectics, where "Dialectics refers to the opposition of conflicting or contradictory principles and their resolution through emergent consequences," (1977, p. 25). Knowledge from this viewpoint is social, as it is created by activities of society, as well as by the activities engaged in by the individual. Thus, "there is a dialectical interaction between the individual's activities and society's activities and the result of the interaction is the individual's knowledge which may, however, change society's knowledge," (Baltes et al, 1977, p. 26).

As we can see from the above, several writers have been in basic agreement that the field of psychology can be carved up into two to three basic underlying models, i.e., the mechanistic, organismic, and most recently the dialectic. We shall refer to this tripartite division of psychology in our discussion of the various epistemic positions currently constituting the field.

Let us now proceed to an examination of these different paradigms and their various explanations of cognitive/behavioral development within the organism.

I THE ORGANISMIC PARADIGM

The organismic paradigm views development as coming about due to intrinsically directed change. It holds that formal cause, defined as the pattern of organization of the object, is primary in an explanation of any developmental change that occurs. Further, the notion of final cause, defined as the end towards which an object develops, is also of great import. The organism is held to mature according to an epigenetic framework, whose unfolding follows a predetermined progression through various levels or stages of development.

> A primary characteristic of this model is its representation of the organism as the source of acts rather than as a collection of acts initiated by external peripheral forces; ...change is accepted as given. This means that change is not itself explainable by efficient material cause; for while efficient causes may inhibit or facilitate change it is formal, rather than efficient cause that is basic (Reese and Overton 1973, p. 172).

The organism is seen as intrinsically active in a Leibnitzean sense, and qualitative change is seen as real and primary; for the organism is held to be a function of changes in structural configuration, resulting in the position that the whole is more than the sum of its parts. Thus man is seen as an organized entity, "a configuration of parts which gain their meaning, their function, from the whole within which they are embedded," (Reese and Overton, 1970, p. 173).

Change in this model is therefore given, and represents a basic change in the configuration of the whole. At each new level, new properties emerge that are irreducible to what has gone before. Formal cause, i.e., structure, leads to behavior due to the final cause as goal. Causation is seen as reciprocal, and linear causality is dismissed as insufficient for an explanation of an organism's behavior. Inquiry within the model is directed toward discovering principles of organization, explaining relationships between wholes and parts, structures and functions, rather than seeking to explain them in terms of simple functions. The epistemological position that arises from this emphasis on inherent structure is constructivism, for the organism can know the world only through the structures that mediate its behavior.

In examining the organismic position in more depth, one finds a great deal of diversity within the "family of theories" that can be classified as lying within its definitional boundaries. The viewpoints within the paradigm constitute four distinctive positions: (A) Leibnitzean, which dismisses efficient or external causality as an epiphenomenon that serves no explanatory function whatever; (B) Maturationalism, of which Gesell is a proponent, which sees the role of efficient or external causality as no more than either the hindering or enhancing of a predetermined maturational unfolding; (C) The Cartesian position, which holds that although both structure and content of cognition and/or behavior are innate, efficient cause external to the organism is usually a necessary condition for its actualization; (D) The Kantian position, which holds that there are innate universal

structuring elements that are either inset at birth or unfold along a developmental progression of stages. There is a clear separation, however, between form or structure as innate, and the content found in a particular experience. The latter of the two can occur only as a result of the external environment impinging on the organism, since the external environment serves as a filler for the internal structuring agent, resulting in an interactive construction of experience.

All of the above positions are rationalistic, as there is an adherence to the notion that at least some important facet of the acquisition of knowledge exists prior to experience. In other words, any explanation of human cognition according to the organismic model will have to take into account the inherent organizational structure of the organism in question. Yet as we shall see, there is a marked difference in exactly how we are to typify the role of the external environment in the following equation: cognitive experience = an interaction between the inherent structures of the organism and the external environment.

The Leibnitzean Viewpoint

In their articles, Reese and Overton (1970, 1973) typify the theories within the organismic tradition as Leibnitzean in tenor, since Leibnitz held that the essence of both mind and substance was intrinsically directed activity. Leibnitz, (1930) rejected the notion of efficent cause, while formulating a philosophical position that

posited a world of individually self-contained monads, whose development unfolded according to a predetermined program. Formal cause was central, and efficient cause external to the monad was seen as illusionary. Monadal development was held to be completely self-contained. Cause and effect that appeared to be external to the monad were seen as arising due to a parallelism in the unfolding of the monad's preformed programs, whose synchrony was assured by God. Thus, despite the fact that material things appear to act according to fixed and ascertainable laws such as cause and effect, and although we are entitled in ordinary language to speak of them as acting on one another according to mechanical laws, in actuality all of these activities are internally produced and are independent from one another, as they are part of a harmonious system pre-established by God.

Within the organismic position as constituted in present-day psychology, one would be somewhat hard-pressed to find a true Leibnitzean. No one is quite willing to dismiss the notion that factors external to the organism play some role in the course of its development. However, Reese and Overton (1970) are quite correct in their assertion that efficient causality has come to play a secondary role in various formulations within the organismic camp.

The Maturational Viewpoint

This viewpoint considers maturation to be a process of continuing organization where:

> The ground plan of this pervasive total pattern is laid down by genes with their remarkable capacity to propagate themselves and to reorganize the surrounding molecules. The sum total of the gene effects is manifested in the hidden mechanism of maturation (Gesell 1928, p. 64.)

Here the viewpoint on how development progresses is based on the quasi-exclusive role of maturation, where developmental activity is held to occur in a Leibnitzean fashion, since there is "a continuous transition from one state to another as the organism produces these states out of itself in increasing succession," (Cassier 1951, p. 29). In opposition to the Leibnitzean position, however, there is a recognition of efficient cause, constituting a factor external to the organism that, while it is not a necessary condition for eliciting development, can facilitate or inhibit development while adding nothing to its predetermined course, form or organization.

The organism is viewed as a self-initiated action system, whose developmental course is governed by the genetics it has inherited. The organism will exhibit only those behaviors that it is developmentally ready to exhibit for "the heredity endowment of the individual will play the primary role in shaping his or her over all pattern and style of growth," since "genes are responsible for the basic development trends of the species traits and of an endless variety of familial traits of individual deviations," (Gesell 1928, p. 71). The deepest determiners of development displayed became biochemical, metabolic, and physiological, unfolding according to intrinsically determined maturational guidelines. The

external environment is neither a necessary condition for elicitation, nor an additive factor, although it can hinder or facilitate the maturational unfolding.

The Cartesian Viewpoint

The third position of import within the organismic framework is decidedly Cartesian in flavor. Descartes (1951) sets forth the notion that our clear and distinct ideas of nature are innate, as is our knowledge of the universal and certain laws of physics, etc. They are not derived from sense experience, for this gives us only particulars, not universals. The role of experience, or efficient causality, is that it furnishes the conditions whereby the mind comes to a realization of these ideas, serving to actualize these innate potentialities. Descartes (1972) attempts to explicate how this comes about via a template matching system, whereby a representation of the external environment projected onto the pineal gland elicits the actualization through matching of an innately derived idea. The important fact of this system, however, is that epistemologically it holds that both the structure and content of our ideas are innate and that the role of efficient causality is that of elicitation of these ideas. It serves as a necessary, but not sufficient, condition for their occurence. Thus the development of the organism's cognitive potentials consists of elicitation of innate potentials by the external environment. The environment adds nothing to cognitive structure or content, which are both innate and internal to the organism.

Within current psychological theory, a similar position in form has arisen with the work of such ethologists as Lorenz (1958, 1965, 1966), Tinberger (1951, 1963), Hess (1970), among others. They conceptualize a genetically preprogrammed nervous system which consists of inherent structures (fixed action patterns), defined as genetically programmed sequences of coordinated motor actions. These are both species specific, and elicited by specific stimuli in the environment, i.e., sign stimuli. The animal performs these coordinated actions without prior learning (Hess, 1970). Lorenz holds that built into the genotype of the organism is a "...limited range of possible forms in which an identical genetic blueprint can find its expression in phenogeny," (1965, p. 1). Thus, certain behaviors are preformed and are unavailable to environmental influence in terms of their form or content, although the environment usually serves as a necessary condition for their occurence. Which is to say that "certain innate nervous system structures just come with the innate ability to select out certain stimuli from the environment; these are the stimuli that elicit (bring forth) the built in (preformed) functional component of the structure that is the response," (Lerner, 1971, p. 100). Thus, according to this theoretical position, behavioral development occurs due to an interaction between the organism and its environment, where the environment serves as a necessary condition for the elicitation of innately inset behavioral patterns.

The Kantian Viewpoint

Let us now continue with our examination of theoretical positions within the organismic family by turning to those who are of a like form with the epistemic position first set forth by Immanuel Kant (1933, 1953).

In reaction to the empiricism that led Hume to reject the notion of necessity in the relationships between cause and effect due to their inductively derived nature, Kant "awoke from his dogmatic slumbers." In so doing, he founded a new form of rationalism based on the premise that since, as proved by Hume, experience cannot yield us universality and necessity in such matters as causation, such knowledge must not arise from experience. This led Kant to advance the notion that not only is there knowledge that is synthetic a posteriori (derived from experience) and analytic a priori (tautologically true due to definition and thus divorced from experiential confirmation), but there must also be a third form of knowledge, i.e., synthetic a priori (knowledge that is logically prior to experience but which is nonetheless derived from experience).

The line of reasoning implicit in the establishment of the category of synthetic a priori knowledge is fairly straightforward. We have a recognition of the necessity and universality of certain occurences in and facets of our environment. This knowledge cannot arise from experience, since experience can only give us particular instances; for example, the fact that a given set of conditions A cause the occurence of B. Experience can never give us the truth of the statement that

the conditions constituting A will result in the occurence of B in the course of future events, as there can be no certitude in inductive knowledge. Yet when these facts are pointed out in experience, we see that what is true of the particular instance must be true of all such instances, for we see its inherent necessity. The reason this is so is that, according to Kant, we construct our world of experience through the vehicle of innately derived categories which serve to structure the world of experiential phenomena.

Our recognition of these categories and/or forms of sensation is not, however, prior to experience in order of time. It is only prior to experience logically, since categorization is necessary but not a sufficient condition for our experience. In other words, Kant's Forms of Sensation, i.e., space and time; and categories, i.e., cause and effect, substance, etc.; are spontaneous products of the perceiving mind that require contact with the external environment in order for our cognizance of them. They are the structuring element whose particular content, as an object of cognition, is derived from an interaction between the organism and the external environment. Hence Kant's maxim that "thoughts without content are empty, intuitions without concepts are blind," (Kant, 1933, p. 18) meaning that cognitive organizational elements without sensation will remain unactualized and unperceived, and sensations without inherent cognitive organization will remain meaningless. These two faculties are seen as being unable to exchange their functions as "the understanding is incapable of intuiting and the senses are incapable of thinking. It is only from the united cooperation of the two that knowledge can arise," (Kant, 1933, p. 18).

Kantianism rejects both the empiricism of Hume, who felt that knowledge was totally derived from the external environment, and the rationalism of Descartes and Leibnitz, who placed both the organization and content of knowledge internal to the organism. Kant, and herein lay his genius, divorces structure from particular content, and in so doing places the universal organizational elements necessary to experience within the organism, while placing the content necessary to any particular experience within the external environment. (It is interesting that the logical outcome of all this is that reality beyond our perception of it is unknowable, as all we can know is our particular construction of it. We shall move to Hegel's objections and his resultant dialectical epistemology shortly, but first let us look at some Kantian positions within present-day psychology.)

As we have seen, the basic tenet of Kantianism is that the world as external to the observer is organized according to the structuring principals inherent to the individual. One may hold that these structuring elements are innate, or one may hold that they develop, varying in form and/or complexity as a function of time and maturational processes.

The first of the above two options is to be found in Chomsky's theory about how language develops. Chomsky (1957) holds that certain organizing principals inherent to the mind provide invariant structures that are the preconditions for linguistic experience. He proposes that all human languages have deep-seated properties of organization and structure, and that these linguistic universal structuring elements should be viewed as part of an innate mental endowment:

> If the grammers of natural languages are not only intricate and abstract but also very restricted in their variety particularly at deepest levels, it becomes necessary to challenge the widespread assumption that these systems are "learned" in some significant sense of the term. It is perfectly possible that a particular grammar is acquired by differentiation of a fixed innate scheme rather than by slow growth of new items, patterns, or associations (Chomsky 1957, p. 19).

Chomsky posits an invariant innate scheme and general features of a transformational system within whose structural elements a rational language can be created. Linguistic function is thus explained in terms of a universal innate organizational element peculiar to the human organism, where the particular content of the language displayed will be dependent on the linguistic community the individual is born into.

Turning aside form the innate Kantianism of Chomsky, we can now turn to the contructive Kantianism of Piaget, who, despite his opposition to Chomsky's model (Piaget, 1970), is also interpretable as being in the Kantian vein as to his epistemic proclivities.

Furth (1973) notes that objectivity, according to Piaget, is not found in the outside world; rather, it is the product of a common species-wide subjective contribution in contact with the external environment. In this Piaget is formally in agreement with Chomsky, but where Chomsky posits an innate organizational structure as the formal cause of language, Piaget views linguistic organization as a construction that is secondary to a cognitive logical mathematical structuring, which is constructed along maturationally derived lines due to the final causation inherent in his notion of equilibrium.

In his theory, Piaget places great insistence on the primacy of internal regulatory mechanisms of development. According to Riegel (1975, 1977), the Piagetian framework pays little attention to social interactions, since development is brought about by inner cognitive leaps, which Riegel holds are inadequately explained by the notion of equilibrium and disequilibrium. The environment provides little else than necessary material for the employment of the child's invariant cognitive operations, once this development due to maturational factors is realized. Under this interpretation of Piaget, content is assimilated to an invariant logical system. Accomodation, once the logical structure is set, does not involve the structure itself, but is rather a realignment of the resultant content, the logic of which is not derived from external sources. Thus, aside from the decidedly dialectical nature of the interplay between assimilation and accomodation during the period of sensori-motor development, it appears that after this period, accomodation occurs more and more with regard to constituent elements, i.e., content within the cognitive system, and less and less with regard to the organizational properties of the system. The organizational structures' posited logic becomes increasingly divorced from the interplay between the organism and the environment. Rather, the environment becomes increasingly structured according to biologically inherent structures, while constituted knowledge is accomodated in light of ongoing experience within the logistics of the overriding structure.

The above is only an interpretation, and one can of course question its veracity. One can still advance the notion that Piaget's constructivism is completely dialectical in the interplay between

internal and external factors. Resultant logical structures can be seen as constructed via an interaction between the organism and the environment in a Hegelian fashion, where an ontological status as well as an epistemic one is given to the logical operations found in later stages. The failure to typify external factors in their construction could then be seen more as a sin of omission rather than as a commitment to the above interpretation, where one reads Piaget as saying that experience with the external environment is only a necessary condition in so far as it is needed to actualize a maturationally based invariant structure. Piaget seems, however, to openly choose the latter of these options in his article, "Intellectual Evolution from Adolescence to Adulthood," (1972). In this article, Piaget specifically rejects the notion that "the formation of operations requires a favorable environment...that the social environment and acquired experience provide the subject with the cognitive nourishment and intellectual stimulation necessary for such a construction," (Piaget, 1972, p. 8). Piaget holds that all normal subjects will attain all stages in an invariant sequence, where the stage of formed operations will be utilized in a different manner according to the experiences they have in their environment. Thus, Piaget writes that "one of the essential characteristics for formal thought appears to us to be the independence of its form from its reality content," (Piaget, 1972, p. 10). In so stating, it would appear that Piaget had definitely posited an invariant structuring element, whose basis of development is maturational, and whose actualization but not formulation is based on interaction with the external environment.

In form, then, Piaget's notion would be quite similar to that found in the psychoanalytic tradition where the nature of the person varies with the maturational stage of his psychosexual development. Despite the difference of emphasis in the psychoanalytic tradition, where the affective and irrational rather than the intellectual and rational are fixated upon, both traditions hold that the world the individual experiences is organized according to inherent organizing principals, logical in the sense of Piaget, illogical and fundamentally sexual in the case of Freud, that progress in their development according to fixed maturational guidelines. Both hold that knowledge in Rapaport's words, "...is the product of our minds' methods of organizing stimulation into experience and our reflecting upon this experience and further organizing it into more global units," (Rapaport, 1966, p. 199).

II THE DIALECTICAL PARADIGM

Dialectics can be viewed both as a mode of reasoning or investigation and as a descriptively true theory about the world. It considers things both in their interconnections with each other, and as dynamically changing entities, where change takes place through the conflict and resolution of opposites.

The dialectical position is much in accord with the organismic tradition examined earlier. It also posits an intrinsically active organism, but it rejects any notion of invariant organizational or formal elements as intrinsic to the organism. Rather, there is an emphasis on change brought about by dynamic interaction between the organism and its environment, where there is an ongoing "opposition

of conflicting or contradictory principles and their resolution through emergent consequences," (Baltes et al, 1977, p. 25). In point of fact, the dialectical position stresses the contradictory process whereby a concept passes over into and is preserved and contained by its opposite. In Riegel's (1975) words, this position moves from a consideration of either extrinsic or intrinsic factors contributing to developmental change in isolation, to a consideration of the complex interactions of both. There is no emphasis placed on stabilizing structures that serve as invariant structuring elements of experience; rather, change in both structure and content of the organism is continuous due to the ongoing interplay between the organism and its environment.

> Development consists rather in continuous changes... Asynchronies and contracts are the basis for developmental progression.... Developmental leaps are brought about by discordance, asynchrony, or conflict between events.... Stable plateaus of balance or tranquility are the exceptions. As soon as developmental task or problem is completed and a state of equilibrium is attained, new questions and doubts arise within the individual (Riegel, 1974, p. 62).

Within the dialectical position as currently constituted, two epistemic positions of note can be delineated. These are the positions set forth by Hegel and his followers, and by those who operate within the Marxist tradition.

The Hegelian Viewpoint

The Kantian framework does not view categories or inherent structuring elements as objectively real entities. They are not ontological principles of being, but epistemological principles of knowing. For

Kant they were the logical necessity for coherent representation of the world, and by their structuring of the world, they allowed such sensuous universals as "red," "horse," etc., to be derived from experience. Hegel's objection to Kant's viewpoint was that Kant granted the categories no ontological status. This results in an unbridgable gap between what is known by the knower (a constructed appearance) and the actual state of the world (the Initself, or reality). Hegel (1967) discards Kant's viewpoint. Structuring elements are given objective ontological status, and as such they are held to be existent separate from the mind of the observer. Hegelian philosophy rejects the schism between the knower and the known, as categories of the knower are held to be inherent in the known and vice versa. The categories for Hegel are both a part of our consciousness, and objective entities as part of the world. Both are one in a Monistic absolute, wherein all contradiction can be resolved via the dialectical method.

The dialectical method revolves around the logical contradiction, "A = not A." Western philosophy emphasizes the fact that "A" is not "not A." In Eastern philosophy the contradiction is disputed on the doctrine that only the One is, and the world of differences is illusion, thus, "A = A." According to Hegel, each identity contains its opposite. Understanding, for instance, holds that two categories are either the same, i.e., there is no difference between them, or different, in which case they are not identical. Reason, however, using the dialectical method, holds that they are both identical and distinct. For instance, Being, divested of superfluous adjectives, is actually Nothing, for both are the same vacancy. Yet how can a thing be both be and not be?

The answer is, "When it becomes," and the category of Becoming therefore resolves the contradiction. Thus results the triactic dilectical structure of thesis, its contradictory antithesis, and synthesis, where a third and more inclusive synthetic category is formulated that resolves the apparent contradiction. This in turn becomes a new thesis, beginning a new triad, until finally a category is formulated that is all-inclusive, giving rise to no future contradictions.

Cognitive structures thereby continually give way and are reformulated due to constructive confrontations in which discordance and contradictions are generated, which are in turn generated by the interdependent mutual interaction of the individual with his environment.

The dialectical method allows for the passage of a thing into its opposite. Through reasoning, we are able to break down the absolute distinctions set up by the understanding. Contradictions are only apparent, not real, for "A" contains "not A," and contradictions only seemingly exist where we have not as yet seen the whole truth about the world.

The dialectic of Hegel has been carried over into the writings of Riegel (1972, 1973, 1975, 1977). The Riegelian system rejects the notion of invariant structure that is innately or maturationally determined. Rather, in keeping with Hegel's granting of ontological status to categories of knowledge, the development of knowledge and/or cognition is seen as a complex interation of four separate yet intertwined dimensions: the inner biological, the individual psychological, the cultural sociological, and the outer physical. Development is

"...firmly based on the interdependent, mutually influencing interactions among these four dimensions," (Reigel, 1975, p. 51). Contradiction and discord are emphasized, and structural plateaus, where equilibrium is achieved, are held to be an exception of secondary importance. Thinking, in the dialectical sense of the word, is defined as "...the process of transforming contradictory experience into momentary stable structures," (Riegel, 1975, p. 51). These structures, however, for Riegel are only the products of thought. They do not represent the dialectical nature of thought itself which is constantly seeking to formulate new synthesis, enabling it to overcome the contradictions inherent in its interactions with the world.

Riegel (1977) adheres closely to the Hegelian tack, as he holds that the materialism inherent in Marxism deemphasizes the organism in order to focus on the ascendency of economic factors in order to explain the course of human development.

The Marxist Viewpoint

Marx, in opposition to Hegel, rejects any ontological status for mind, regarding it as simply matter that thinks, having no objective truth aside from what is realized in practice. Man's special capacity is his creative intelligence, in opposition to an animal's, whose activities are mere execution of innately given instinct. Man's activities are governed by mentally structured purposes or plans. Man is intrinsically active and has not only the capacity to create, but the need to.

In his book, Capital, Marx (1955) points out that man's ultimate nature is formed by the societal conditions in which he finds himself. The modification of man's capacities and needs occurs primarily through the influences of the forces of production. Further, since the productive forces are ultimately of men's own creation, man in effect creates himself, for he changes his own nature as he changes his external world. Man is both a product of society and its maker. He is a social being, for a human essence is not abstraction inherent in a single individual; rather it is an ensemble of social relations (Marx, 1967). Thus, the resultant individual is the totality of social relations, a social product.

From the viewpoint of historical materialism, Being determines consciousness, and human attitudes, opinions and evaluations are all historical products. The general psychological structure of man depends on the pattern of social realtionships he experiences. These relationships are the basis of his consciousness -- they create it.

Man is not born with innate ideas or structures, but is instead born with certain possiblities of development that are organized according to historically formed psycho-physical structures. What he becomes in the course of ontogenesis is a wholly social product. It is formulated and imparted via language, which embodies a certain form of thinking.

Russian psychology has been based for the most part on the Marxist epistemological framework. Since Pavlov, the Russians have made a distinction between the first signal system, which is reflexive

orientation by the organism to its environment, and second signal system, which is language (Dale, 1966). Language serves to free the human organism from control by immediate stimulus events in the environment, thereby allowing mental planning and voluntary behavior.

Vygotski (1962), in his book, Thought and Langauge, advances a decidedly Marxist line in formulating a model of human cognitive development. In Vygotski's formulation, man is not only acted upon by stimulation from external reality, he also acts upon his environment in order to create new external stimuli. One such set of constructed stimuli that results in a modified response to the environment is man's linguistic communication system. This system is internalized by the child and becomes his highest self-regulatory system (Pavlov's second signal system). Consciousness is seen as developing and having its material embodiment in language. Man's development is further held to be discontinuous with other animals due to the existence of this system, which is a radical departure from a strict mechanistic S-R viewpoint.

Vygotski also argues that the primary mechanism by which consciousness is created is wholly external (a notion that finds considerable expression in the Marxist philosophical frame of reference). For example, he argues that only after language is used in social communication can it be employed with respect to one's own mental processes. Words evolve first as a means of external communication. Only then can they be employed in regard to one's own inner thoughts and feelings. (Note: This argument is strictly anti-Cartesian as it denies the

possibility of private language. Its more complete expression in English philosophical thought occurs in the book Philosophical Investigations (Wittgenstein, 1953).

For Vygotski, the course of mental development is characterized by the internalization of initially external linguistic and conceptual forms and acts. There is also a recognition of thought itself, which is more inward than inner speech. Thought can only be accessed via inner speech, however, which in turn comes about as a result of our social communications.

Thus, as opposed to Piaget who holds that the development of thinking moves from individual to society, Russian psychology views thought as moving from the social to the individual, as "the speech structures mastered by the child become the basic structures of his thinking.... Thought development is determined by language, i.e., by the linguistic tools of thought and by the sociocultural experiences of the child.... The child's intellectual growth is contingent on his mastering the social means of thought that is language.... The nature of development itself changes from biological to sociocultural," (Vygotski, 1962, p. 51).

This viewpoint is carried forth in the work of Luria (1976), who concludes that "...the structure of cognitive activity...does not remain static during different stages of historical development, and that the most important forms of cognitive processes -- perception generalization, deductive reasoning, imagination, and analysis of one's own inner life -- vary as conditions of social life change,"

(p. 161). Thus, the "basic categories of human mental life can be understood as products of social history -- they are subject to change when the basic forms of social practice are altered and thus are social in nature," (Luria, 1976, p. 164).

In conclusion, Marxist dialectics hold that categories of thought as well as particular content are both derived from the external environment, i.e., the linguistic community into which one is born. Man is seen as an active creative organism, who both modifies his environment and in so doing modifies himself. The resultant organizational structures are thereby created via the interaction between the organism and the environment while at the same time they are first produced in and then in consequence derived from the environment external to the organism.

III THE MECHANISTIC PARADIGM

The mechanistic model sees development as occuring due to a history of environmental stimulation. Complete prediction is possible in principle, since efficient cause can give sufficient conditions. The organism is seen as reactive, and qualitive change is held to be either an epiphenomenon or is determined by quantifiable efficient causes. The whole is thus the sum of its parts, and efficient cause explains change, for it is the source of change. Development can be explained in terms of accretion of S-R connectors to which it is reducible. Behaviors, not structures, are primary and quantifiable.

Causality is unidirectional, and linear causality offers a complete and sufficient explanation. Inquiry is directed toward explication of S-R causal relationship, leading to prediction and control of behavior.

The mechanistic tradition's basic epistemological outlook can be found in the writings of Locke (1959), who advanced the notion that the mind at birth is a tabula rasa, a blank slate on which the hand of experience is free to write. All knowledge was held to arise from the external environment, which consists of sensible universals inhering in an underlying substance.

This empiricism was carried forward by Berkely (1901) in his Principals of Human Knowledge and Three Dialogues Concerning Natural Religion. He rejected Locke's notion of substance as being untrue to the empirical criteria that all knowledge must arise from experience. Since substance is not experienced, as we are only given sensible impressions such as color, shape, texture, etc., one cannot hold that something is existent beyond these various impressions we experience. Berkely finally lapses into idealism, however, as his dictum, "To be is to Be Perceived" is coupled with a God who always perceives, serving to guarantee that the existence of an object with no current human perceiver will continue, since it is a perception in the mind of God.

It is with David Hume (1951, 1955) that empiricism is set forth in the form that served as the foundation of the logical atomism of Russell (1921) and Wittgenstein (1951), the ultimate expression

of which can be found in Wittgenstien's Tractatus, and the logical positivism of the Vienna Circle, the most succinct statement of which is found in Ayer (1952).

Hume rejected the veracity of any concept, such as substance or God. He advanced the notion that any idea whose origin cannot be traced back to the level of sensory impressions should be rejected as meaningless.

> When we entertain, therefore, any suspicion that a philosophical term is employed without any meaning or idea (as is but too frequent), we need but to inquire, from what impression is that supposed idea derived. And if it be impossible to assign any, this will serve to confirm our suspicion (1955, p. 21).

Hume's empiricism served as the foundation for a belief that cognitive development could be explained through an association of ideas derived from external experience in a strict cause and effect manner. Such knowledge was to be considered cumulative, and to be explained by the existence of sensible impressions, which could be broken down into component elements without loss of meaning and which were external to the organism.

This criterion of meaning and attendant empiricism, formulated by Hume, gave rise to logical atomism, positivism, and operationalism. The meaning of a term was seen to be the method of its measurement, and if no empirical measurement or translation into observable terms was possible, then a term was seen as meaningless. These criteria became in turn the central guidelines for the radical behaviorism that

has had such an impact on the American psychological scene. As Skinner (1945) noted, behaviorism has been nothing more than the complete operational analysis of traditional mental concepts. This operationalism has required that each mentalistic concept be tied definitionally to a single measuring operation, while the attendant positivist position has required that such concepts be fully definable in observable terms. Thus, if a mental concept cannot be so defined, it is meaningless (methodological behaviorism); if it can be so defined, it is empty (analytic behaviorism).

A succinct statement of an updated version of Locke's central epistemic position, i.e., tabula rasa, can be found in Gagne (1970), where he states that cognitive development can best be viewed as the result of the interaction of growth and learning since within the limitations imposed by growth, behavioral development results solely as a function of the cumulative effects of learning. Within this tradition, the cumulative effects of learning are seen as being explained by an analysis of past antecedent-consequent conditions. For such theorists as Bijou and Baer, the "...developing child may be adequately regarded in conceptual terms as a cluster of interrelated responses interacting with stimuli," (1961, p. 14).

Skinner (1974), probably the best-known proponent of this position in the current scene, argues that mentalistic concepts are worthless, as they do nothing in the way of controlling behavior. What is needed is a functional analysis of behavior, in order to identify and isolate those environmental variables of which the organism's behavior is a lawful function.

This learning theory viewpoint is succinctly defined by White as adhering to the following set of assumptions:

1. The environment may be unambiguously characterized in terms of stimuli.

2. Behavior may be unambiguously characterized in terms of responses.

3. A class of stimuli exists which, applied contingently and immediately following a response, increases it or decreases it in some measurable fashion. These stimuli will be treated as reinforcers.

4. Learning may be completely characterized in terms of various possible couplings among stimuli, responses and reinforcers.

5. Unless there is definite evidence to the contrary, classes of behavior may be assumed to be learned, manipulable by the environment, extinguishable and trainable (1970, p. 665).

CONCLUSION

In concluding our examination of various epistemic positions in psychology, it would seem that one can hold one of five broadly defined positions on how behavior develops within a given organism. (See Figure 1.1)

In position I, one can adhere to the notion that behavior and/or knowledge is innately inset. Three theoretical positions posited completely inset knowledge structures, where the influence of the environment or efficient causality was either 1) non-existent (Leibnitz); 2) existent but unimportant as it could only enhance or detract from development (Gesell); 3) existent and necessary for

EPISTEMIC INTERACTION PATTERNS

POSSIBLE BETWEEN ORGANISM AND ENVIRONMENT

O = ORGANISM

E = ENVIRONMENT

FIGURE 1.1

actualization, but not for the formulation of actual content (Descartes, Ethologists). Each of these three positions viewed development as proceeding outward from the organism, where both the organization and content of knowledge, or the behavior displayed, were intrinsic to the organism.

Position II, like position I, is also contained within the organismic paradigm and can be found for example in the Kantianism of Piaget. It demarks a clearly different viewpoint on how such development progresses. Here the organizational elements necessary to a particular behavioral development are seen as either innately inset or as developing along epigenetic guidelines, while particular content displayed is seen as resulting from interaction with the external environment. Thus, efficient causality is seen as a necessary condition for the content of knowledge, although not for the structure of knowledge.

Position III (Hegelian) arises within the dialectical paradigm and holds that factors both within and extrinsic to the organism are necessary both to the organization and content of knowledge. Categories of thought are both intrinsic and extrinsic to the organism and behavioral organization arises due to a complex interaction of material, efficient, formal and final causality.

Position IV is also found in the dialectical paradigm, in the materialism of the Marxist position. Here there is an active organism, which, even though it generates changes in the structure and organization of the external environment, still derives both organization and content of its intellect from external sources.

Finally, in position V, both form and content of behavior are derived passively from external sources, with some account being taken of the material realities as causal in the organism. This position is found in more radical forms of behaviorism.

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